

S/N 10/700,419

Atty Dkt No. GP-302502 (GM-0392PUS)

Listing of Claims

1. (currently amended) An apparatus for applying and releasing a clutch piston in a clutch cylinder, the apparatus comprising:

a fill oil chamber having first and second portions separated by a fill piston, said first portion being a fluid communication with the clutch cylinder through a first passage, and said second portion being in fluid communication with a second passage; wherein said fill oil chamber is positioned below the lowest sump level of a transmission in which the apparatus is positioned;

a third passage in fluid communication with the first passage; and

a fill control valve operative to alternately communicate the second passage to a transmission line pressure passage or an exhaust passage, and further operative to alternately communicate the third passage to a controllable source of pressurized oil having a signal pressure or to close the third passage.

2. (original) The apparatus of claim 1, wherein said fill control valve comprises a double spool valve biased by a spring.

3. (original) The apparatus of claim 1, wherein said third passage is connected to the first passage through an orifice.

4. (cancelled)

5. (original) The apparatus of claim 1, further comprising a snubber formed in the fill oil chamber to cushion movement of the clutch piston when applying the clutch piston.

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6. (original) The apparatus of claim 1, wherein the apparatus is operative to switch between application of line pressure or signal pressure to the clutch piston to cause a rapid, controlled application and release of the clutch piston.

7. (currently amended) A method for applying and releasing a clutch piston in a clutch cylinder, the method comprising:

providing a source of transmission line pressure;

providing a controllable source of pressurized oil having a signal pressure; and

alternately communicating the clutch cylinder with the source of transmission line pressure and the controllable source of pressurized oil to control application and release of the clutch piston; wherein said step of alternately communicating comprises, when applying the clutch piston, communicating said source of transmission line pressure with the clutch cylinder via a fill piston until the fill piston bottoms out, and then communicating said controllable source of pressurized oil to the clutch cylinder to cause a smooth, controlled clutch application.

8. (cancelled)

9. (original) The method of claim 8, further comprising controlling said controllable source of pressurized oil to control the normal force on a clutch pack applied by the clutch piston during applying, holding and releasing of a clutch.

10. (currently amended) A method for applying and releasing a clutch piston in a clutch cylinder, the method comprising:

providing a source of transmission line pressure;

providing a controllable source of pressurized oil having a signal pressure; and

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alternately communicating the clutch cylinder with the source of transmission line pressure and the controllable source of pressurized oil to control application and release of the clutch piston; wherein said step of alternately communicating comprises, when applying the clutch piston, communicating said source of transmission line pressure with the clutch cylinder via a fill piston until the fill piston bottoms out, and then communicating said controllable source of pressurized oil to the clutch cylinder to cause a smooth, controlled clutch application;

controlling said controllable source of pressurized oil to control the normal force on a clutch pack applied by the clutch piston during applying, holding and releasing of a clutch; and

~~The method of claim 9, further comprising~~ reducing pressure of said controllable source of pressurized oil to enable a spool valve spring to move a spool valve to exhaust pressure from the clutch cylinder and allow a clutch return spring to move oil from the clutch cylinder to a fill oil chamber to be available for the next apply stroke.

11. (original) A method for applying and releasing a clutch piston in a clutch cylinder, the method comprising:

providing a source of transmission line pressure;

providing a controllable source of pressurized oil having a signal pressure;

communicating said source of transmission line pressure with the clutch cylinder via a fill piston until the fill piston bottoms out;

thereafter communicating said controllable source of pressurized oil to the clutch cylinder to cause a smooth, controlled clutch application; and

controlling said controllable source of pressurized oil to control the normal force on a clutch pack applied by the clutch piston during applying, holding and releasing of the clutch pack.